Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

1. (currently amended) A microfluidic device for solid phase extraction of nucleic acids from samples, said microfluidic device comprising

a body structure provided with a microchannel and an inlet port and an outlet port, wherein said inlet port and outlet port are formed on an exterior surface of said body structure and are in fluid communication with said microchannel, said microchannel having an interior surface and a first and second end; and

a sol-gel matrix that spans a cross sectional dimension of the microchannel, wherein the nucleic acids bind to the sol-gel matrix.

2. (original) The microfluidic device of claim 1 wherein the sol-gel matrix further comprises silica particles.

3. (original) The microfluidic device of claim 1 or 2 wherein the device further comprises a reaction chamber in fluid communication with the microchannel and the outlet port.

4. (original) The microfluidic device of claim 1 wherein the sol-gel matrix is prepared using tetramethoxy orthosilicate monomers.

5. (original) The microfluidic device of claim 1 or 2 wherein the sol-gel matrix comprises pores having a diameter selected from the range of about 0.1 μm to about 10 μm.

6. (original) The microfluidic device of claim 5 wherein the average diameter of the sol-gel matrix pores is about 1 μm to about 5 μm.

7. (original) The microfluidic device of claim 5 wherein the sol-gel matrix is bound to the interior surface of the microchannel.

8. (original) The microfluidic device of claim 7 wherein the sol-gel matrix fills the microchannel from the first end to the second end.

9. (currently amended) A method of extracting nucleic acids from a biological sample said method comprising

contacting said sample with a chaotropic agent;

providing a microcolumn containing a sol-gel matrix having a cross sectional dimension ranging from about 50 mm^2 to about 100 μm^2;

loading the sample onto ~~a~~ the microcolumn under conditions conducive for nucleic acid binding to the ~~column, wherein said column comprises a~~ sol-gel matrix ~~having a cross sectional dimension ranging from about 50 mm^2 to about 100 μm^2~~;

washing the matrix with a solvent; and

releasing the bound nucleic acid from the column.

10. (original) The method of claim 9 wherein the sol-gel matrix has a cross sectional dimension ranging from about 24 mm^2 to about 100 μm^2.

11. (original) The method of claim 10 wherein the nucleic acid is DNA.

12. (original) The method of claim 10 wherein the sol-gel matrix comprises pores having a diameter selected from the range of about 0.1 μm to about 10 μm.

13. (original) The method of claim 9 wherein the nucleic acid is released from the column by washing with a buffer that is compatible with PCR reactions

14. (original) A nucleic acid processing system comprising

a base provided with a first and second microchannel, said first and second microchannels each having an interior surface and a first and second end;

a first port formed on an exterior surface of said base and in fluid communication with the first end of said first microchannel;

a second port formed on an exterior surface of said base and in fluid communication with both the second end of the first microchannel and the first end of the second microchannel;

a third port formed on an exterior surface of said base and in fluid communication with the second end of said second microchannel; and

a sol-gel matrix that spans a cross sectional dimension of the first microchannel, wherein the nucleic acids bind to the sol-gel matrix.

15. (original) The nucleic acid processing system of claim 14 wherein the base further comprises a reaction chamber in fluid communication with the first and second microchannel and the second port.

16. (original) The nucleic acid processing system of claim 14 wherein the first, second and third ports are each formed on the same exterior surface of the base.

17. (original) The nucleic acid processing system of claim 14 wherein said device further comprises pumping means in communication with said reaction chamber to regulate fluid flow to and from the reaction chamber.

18. (original) The nucleic acid processing system of claim 14 wherein said device further comprises pumping means in communication with the first and second microchannels that regulates fluid flow through the first and second microchannels.

19. (original) The nucleic acid processing system of claim 18 wherein the wherein the sol-gel matrix comprises pores having a diameter selected from the range of about 0.1 μm to about 10 μm.

20. (original) The nucleic acid processing system of claim 19 wherein the sol-gel matrix is bound to the interior surface of the first microchannel.

21. (original) The nucleic acid processing system of claim 18 wherein said second microchannel is provided with reagents for analyzing nucleic acids.

22. (original) The nucleic acid processing system of claim 18 wherein the base is a microfluidic device.